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Facts About WIND EROSION and DUST STORMS on the Great Plains

Leaflet No. 394

U. S. DEPARTMENT OF AGRICULTURE

Facts About
WIND EROSION AND DUST STORMS
on the Great Plains

By Soil Conservation Service

WIND EROSION and dust storms have become serious problems to people living on the Great Plains. Each major drought of the last 60 years has brought widespread soil blowing. Twice within the last 30 years parts of the Plains have been called a "dust bowl." The normally high winds and recurring droughts will always threaten this region with the possibility of crop failures, dust storms, and land damage by wind erosion.

Severe droughts have been coming to the Great Plains for centuries. Early explorers who crossed the Plains during wet periods usually wrote of the region as an ocean of lush grass. But explorers who crossed during droughts called it a desert. Most American maps made before 1860 labeled the region "The Great American Desert."

The southern Plains has had a major drought about once every 20 years since the area was first settled by farmers in the 1880's. Prolonged drought has not come to the northern Plains at such regular intervals; nevertheless, the northern Plains has had some severe droughts in recent times.

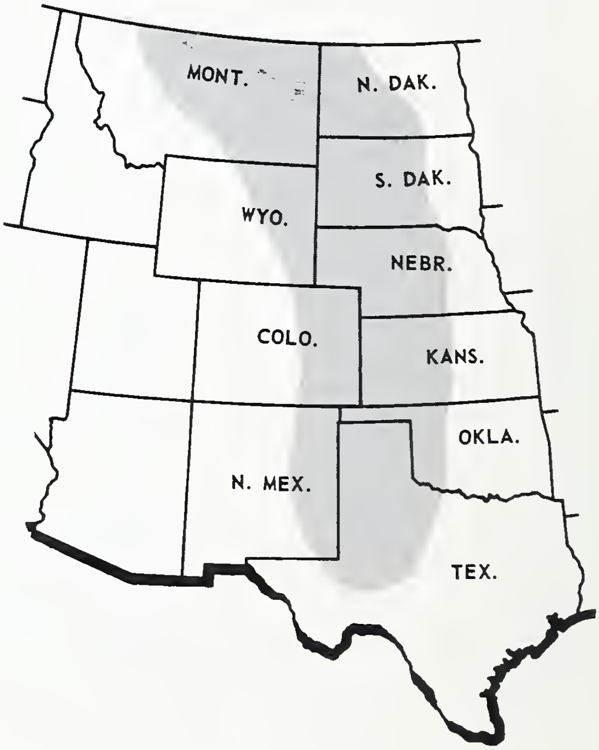
Droughts will recur and the wind will continue to blow, but we don't need to have "dust bowls" every 20 years or so. Wind erosion and dust storms can be held in check. Proper land use and good soil and water conservation practices would prevent much of the damage to the land, crops, and people during these recurring droughts.

Droughts During Early Settlement

The first extensive settlement of the southern Great Plains by farmers began the year after the great blizzard of 1886 killed many of the cattle on the big ranches. Settlement gained momentum until 1892. During this time much of western Kansas and many farms in eastern Colorado and western Texas were settled.

A drought started over most of the southern Plains in 1890 and by 1892 was severe. As the drought persisted the movement of settlers was mainly eastward from 1892 through 1895. Good rains came to most of the region during the latter 1890's. By 1899 settlement was again in full swing and continued for more than a decade.

Another long drought began in 1910 and lasted through 1913 over most of the southern Plains. Most of western Kansas had been settled when this drought began. Also, many farms in the panhandles of Oklahoma and Texas and eastern Colorado and New Mexico were settled. During this drought, dust storms were probably worst in Thomas County, Kans. Here, between 1912 and 1914 more than 65,000 acres blew severely—probably as severely as any area of



The Great Plains.

similar size has blown since. But this was not the only area that had dust storms.

Most of the Plains had above-normal rainfall from 1914 to 1930. There were a few dry years and many local droughts. Parts of the southern Plains had a rather severe drought in 1917–18, but settlement continued at an accelerating rate. By 1931 the sod had been plowed on much of the land suitable for cultivation and on about 5 or 6 million acres that were not suitable.

Settlement on the northern Plains from the 1880's to 1931 followed much the same trend as that on the southern Plains but was not so erratic. Droughts came to the northern Plains frequently but usually did not last so long. Also, the hot, searing winds of summer were not so severe. Fewer farmers abandoned their farms and returned East during the droughts. They had many trying times before the long drought of the 1930's, but settlement proceeded westward across Nebraska, the Dakotas, Montana, and Wyoming at a fairly even rate. By 1931 most of the land suitable for cultivation on the northern Plains, and some that was not suitable, had been plowed for cultivation.

The First Dust Bowl

In the summer of 1931 another long drought started on the Great Plains. This one persisted for more than 7 years on the southern Plains and for 5 years on the northern Plains.

This land was so severely eroded by wind during the first Dust Bowl (1931–38) that the farm had to be abandoned. The buildings were later torn down.

More than three-fourths of the cultivated land in the Plains is suitable for continuous cultivation. When moisture is adequate this land produces bumper crops.

Dust storms did not become serious until the fall of 1933, 2 years after the drought started. But wind erosion and dust-filled air became worse each year over all the Great Plains until the fall of 1936 and over most of the southern Plains until the fall of 1938. Millions of acres of land were severely damaged by wind erosion. Many fields lost from 2 to 12 inches of topsoil. Some sandy land became sand dunes. Thousands of farmers abandoned their farms and left the Plains. It was during this period that the Nation's journalists named the southern Great Plains the Dust Bowl. Some included the entire Plains area in this label. A few pessimists argued that the whole region should be planted to grass. During the Dust Bowl years and the following years, several million acres of eroded and abandoned cropland were converted to grassland.

Good Times Return

Good rains came again, as they had after each previous drought. From 1940 through 1949 most of the Plains had above-normal rainfall. There were some dust storms, of course. Many unprotected fields blew each spring, especially in the sandy-land cotton country of western Texas and eastern New Mexico. A few dust storms were regionwide. But wind erosion

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COASTAL PLAIN EXPERIMENT STATION
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and dust-filled air were mainly local problems during this wet decade. Good yields and high prices for both wheat and cotton were the rule.

Many new settlers came to the region in the 1940's to occupy farms that had been abandoned during the 1930's or to plow up land on the western fringes of the old Dust Bowl. The crop failures and dust storms of the 1930's seemed past history. Many of the newcomers and some oldtimers began to think that good rains and bumper crops were normal. They plowed up a lot of the remaining grassland; altogether, about 4 million acres were plowed in the southern Plains between 1942 and 1952. At least 3 million of these acres were not suitable for permanent cultivation; they were either in the dry area with thin soil west of the old Dust Bowl or had sandy soil that blew readily. The plow-up of grassland in the northern Plains was not so great during this wet period. Yet hundreds of thousands of acres unsuitable for permanent cultivation were plowed.

Drought Returns

Drought returned to the southern Plains in the early 1950's. It started in southwestern Texas and southeastern New Mexico in the summer of 1950. By 1951 it had spread to most of the southern Plains; in 1952 all the Plains region was gripped by drought. Over most of the northern Plains the drought lasted only 1 year. But it persisted through 1953 and 1954 over most of the southern Plains.

Soil blowing was severe in the sandy-land cotton country of western Texas and eastern New Mexico in the spring of 1953. Sand dunes, 20 to 30 feet high, were piled up on many fields. But dust storms did not become severe in the wheat-growing section to the north until 1954. Some unusually high winds in the spring of 1954, however, blew several inches of topsoil off nearly all unprotected fields from southwestern Nebraska and northeastern Colorado to western Texas and southeastern New Mexico. By the fall of 1954 probably more land was in condition to blow than at any previous time in the history of the Plains. Severe blowing in early 1955 led national news agencies to again label the southern Plains a Dust Bowl.

How Wind Erosion Starts and Spreads

Drought is an important factor in causing wind erosion and dust storms. But drought alone does not cause severe wind erosion. Soil blowing occurs only when high winds come in contact with loose, unprotected soil. Fields that are well protected with vegetation will not blow severely regardless of how dry it gets, except when nearby blowing fields ruin the protective vegetation.

About 14 million acres of present cropland on the Plains has thin or sandy soil and is not suitable for permanent cultivation. Sand dunes like these form on many fields during long droughts.

Most soil blowing starts on poor cropland. Land-capability surveys show that more than 14 million acres of the cultivated land of the Great Plains has a thin layer of soil or is sandy, or receives so little rainfall it is not suitable for permanent cultivation. This land should never have been plowed. It produces profitable crops only during wet years. Crop failures are common during droughts. When a drought persists for 2 or 3 years the vegetation and organic matter in the surface soil are usually exhausted. Then the soil starts to blow every time a high wind comes.

All soil blowing does not start on cropland that is not suitable for cultivation, however. Sometimes it starts on good cropland that has been improperly farmed. Or it may start on rangeland that has been severely overgrazed, especially where sandy soils prevail.

When wind erosion once starts it tends to spread from field to field and farm to farm. The wind carries loose soil particles across field and farm boundaries. Where a soil particle strikes bare ground it blasts loose other particles which, in turn, are swept across the ground surface and cause still further erosion. The blowing soil particles may cut off tender, growing plants at the ground surface. Or they may cover both growing and dead vegetation with drifts and hummocks of dust or sand. When the growing plants are cut off, the soil is likely to blow with the next high wind. Likewise, a field covered with drifts or hummocks of loose soil will probably blow seriously during the next windstorm. If high winds come frequently for several weeks or months, the soil blowing that started from a few fields may spread over an entire community.

What Can We Do?

The conservation programs worked out by farmers and ranchers with the aid of the Soil Conservation Service, State agricultural colleges, and other agencies proved effective in controlling wind erosion in the Dust Bowl of the thirties. With a few modifications, the same measures are still advocated.

The more than 400 soil conservation districts in the Great Plains cover 90 percent of all farms and ranches of the region and are well organized to combat wind-erosion problems. Each district has its own long-range conservation program for prevention of wind erosion. And each district has an emergency program for checking soil blowing on fields where it starts.

But too few farmers and ranchers have been following the long-range program of their soil conservation district. And many have failed to follow the recommended emergency measures when their land started to blow. Hence, the soil blowing from their fields and pastures has greatly damaged nearby crops and land of conservation farmers and ranchers.

The long-range conservation programs and emergency measures vary from area to area and district to district, depending on such factors as the capability of the land and the type of farming. Even within one district, they may vary. The basic principles for these programs are the same, however, for all land in the Great Plains that is subject to wind erosion.

Some well-protected fields may be seriously damaged by drifting soil from nearby unprotected fields.

Cropland that is not suitable for cultivation should be converted to grassland. This formerly eroded wheatfield, now covered with a good stand of crested wheatgrass, makes an excellent pasture.

Long-Range Conservation Programs

Any long-range conservation program must provide for using each acre within its capability and for treating it according to its needs for protection and improvement. To carry out this program on the Plains, considerable change in land use must be made in some areas and better soil-, water-, and crop- and range-management practices generally adopted.

Changes in land use

About 14 million acres not suitable for permanent cultivation are now being cultivated on the Great Plains. Nearly all this land is subject to wind erosion during prolonged droughts; some of it blows every year. Part is sloping land and is also subject to water erosion during heavy rains. All of these 14 million acres should be converted to permanent grassland as soon as feasible. Converting poor cropland to grassland can be done economically, however, only during periods of normal or above-normal rainfall.

The Great Plains is one of the important agricultural regions of the Nation. It need not become wholly a grazing region. More than three-fourths of the present cropland can be cultivated safely if soil and water conservation measures are used and cropping systems are planned as though every year might be a drought year.

There is still a little grassland that is suitable for cultivation. Using this grassland for cultivated crops would help offset the conversion of poor cropland to grassland. It is important, however, that no grassland be plowed except where soil surveys show it suitable for permanent cultivation. Once the sod is broken, it is difficult and often expensive to reestablish grass on a field, especially during droughts.

Management of cultivated land

Tillage methods and cropping systems should be changed on many farms to reduce wind-erosion hazards. And better water-conservation practices are needed on many farms.

Stubble mulching and other tillage methods that leave crop residues on or near the ground surface should be used on all cultivated fields. In the spring-wheat area of the northern Plains and on land that is to be fallowed in the winter-wheat area, it is usually best to wait until spring to till the stubble. Crop residues on the ground surface help protect the soil from the force of high winds. They also improve soil structure, which allows water to soak into the soil more readily.

Winter cover crops are needed on most cottonfields subject to erosion. Most large fields that are likely to blow need strips of sorghums or other wind-resistant crops. More sorghums and other wind-resistant crops should be grown in rotation with wheat and cotton crops. But the crop rotations need to be flexible and adjusted to seasonal variations of moisture. Most farms need more feed crops to relieve grazing pressure on grasslands, growing wheat, and sorghum stubble.

Water is the lifeblood of Plains agriculture. Seldom does this region get too much rain. Water conservation will pay even during the wet seasons. It may mean the difference between success and disaster during droughts. In addition to stubble mulching and other tillage and cropping methods that conserve water, many sloping fields need contour tillage, terraces, and other water-conserving structures. Some sloping fields may need grass waterways to dispose of runoff.

Most of the irrigation water for the southern Plains comes from wells. Water is being pumped from the ground much faster than it is replenished in most areas. Hence, irrigation practices that use less water would help. Restrictions or regulations on the drilling of new irrigation wells are needed in some areas.

Management of rangelands

The main objective of a rangeland-conservation program should be to restore and maintain the best possible plant cover the soil and climate will support. To do this, livestock grazing should be adjusted to forage supplies, year by year and season by season. It is especially important to reduce livestock numbers during drought periods when forage supplies are short.

Some ranges need improvements, such as additional livestock-watering places. Others need more fencing so that livestock can be rotated or can be kept out of pastures during critical periods. Water spreading,

Sorghums and other wind-resistant crops help prevent wind erosion, especially if high stubble is left on the ground during the winter and early spring.

Stubble mulching and other tillage methods that leave crop residues on or near the ground surface help prevent soil blowing.

Water conservation may mean the difference between crop success and crop failure on the Plains. The terraces and contour furrows shown here held all the water that fell during a 4-inch rain.

pitting, gully control, and other water-conserving measures would improve many ranges. Likewise, brush eradication and reseeding of grasses are needed on much rangeland. Reserve feed supplies of hay, silage, or stacked feed are an essential part of a range-conservation program; this helps relieve grazing pressure on the ranges during droughts.

Emergency Measures for Blowing Fields

A long-range conservation program will seldom stop soil blowing if the program is started after drought is already underway. Farmers and ranchers with unprotected and blowing fields must adopt temporary, emergency measures to bring the land under control while a long-range program is being installed.

Rain does little to stop soil blowing, except to furnish moisture to grow a plant cover or to make emergency tillage more effective. A blanket of snow will prevent blowing during the winter. But few bare fields of the southern Plains ever get that kind of snowfall. Snow usually falls during blizzards and is blown into drifts. This leaves most of the ground bare except where vegetation helps to hold the snow where it falls. In other words, rain or snow alone does not check wind erosion. Positive measures must be used.

Temporary measures for checking soil blowing are of three main types: (1) Emergency tillage, (2) emergency plant cover, and (3) reduced grazing.

Emergency tillage

Emergency tillage may check wind erosion on some fields if done properly and at the right time. But it can give only temporary relief. Therefore, it should be used only in emergencies as a stopgap until a plant cover can be grown. In some cases repeated tillage has prevented serious land damage for a whole season; in other cases it has been effective only for a few days or a few hours.

Emergency tillage should be used only on fields where clods or heavy, moist soil can be brought to the ground surface. If used on loose, dry soils it may do more harm than good.

Chisels and listers are most commonly used for emergency tillage. But any implement that brings clods or moist soil to the ground surface may be used. Tillage should be started as soon as a field starts to blow. On nearly level land the furrows are plowed across the path of prevailing winds. On sloping fields they are plowed on the contour. Normally the plowing should be in strips with unplowed strips between. This permits later tillage of the unplowed strips.

Emergency plant cover

A plant cover should be established on blowing land at the first opportunity. Emergency cover crops must be planted as soon as there is enough moisture to start their growth. Weeds that grow on a blowing field should be protected until enough rain falls to grow a cover crop.

Grain sorghums, sweet sorghums, Sudan grass,

Emergency tillage may check soil blowing temporarily. This blowing field was listed during a windstorm; the space between the furrows may be listed if the field starts to blow again.

broom corn, and millet are the best cover crops for the southern two-thirds of the region. They may be planted any time there is enough moisture in the soil from spring to early fall. Wheat, barley, and rye may be used as emergency cover if fall rains are adequate.

Reduced grazing

A lot of rangeland is damaged by soil blowing onto it from nearby cropland. But during droughts some rangeland blows because of heavy grazing, especially where sandy soils prevail. Grazing should be avoided on blowing rangeland, if at all practical.

Grazing should be kept to a minimum on growing wheat and other winter cover crops during droughts. During the winter, sorghum stubble and other protective vegetation on fields that are subject to blowing should be grazed lightly, or not at all.

Conservation Pays

Many farmers and ranchers throughout the Great Plains have been practicing good soil and water conservation measures since the Dust Bowl of the 1930's. Most of them fared much better during the drought of the early 1950's than did their neighbors who failed to practice conservation.

Yet some conservation farmers followed the best land use and conservation practices and still saw their crops and land seriously damaged by the careless farming practices of their neighbors. This points up the fact that wind-erosion control must be carried out on a community or regional basis to be most effective.

Most communities where conservation farmers predominated were not seriously affected by the drought of the early 1950's. A survey showed that this was due mainly to better land use and improved farming methods. Much of the eroding land had been converted to grassland. Stubble mulching was a common practice on wheatlands, and more cover crops were being grown.

Dust storms and wind-erosion damage would have been much worse during the early 1950's without these conservation farmers and ranchers. But the fact remains that there were not enough of them.

All the people who till or graze the land in the Great Plains must adopt good land use and soil and water conservation practices and plan for recurring droughts if this region is to have a permanent and profitable agriculture. The alternative is bigger and worse "dust bowls" with each succeeding drought. And there will be more droughts, because drought is a normal feature of the climate in this region.

Issued June 1955
Slightly revised 1961

Washington, D. C.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1961 O—584141

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